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Roxbury Community College
Summary of Current Waste Management and Recycling Program And Recommendations for Increasing Diversion

Prepared for:

The Executive Office of Environmental Affairs

By:

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Project Basis

This project has been funded by the Massachusetts State Sustainability Program of the Executive Office of Environmental Affairs. The first project goal is to examine solid waste and recycling efforts at college and university campuses throughout the State, with respect to meeting the recycling goals waste bans promulgated by MA DEP. Based upon that review, proposals are made for incremental improvement in waste management and recycling practices to increase diversion of materials and reduce disposal in a most cost-effective fashion.

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Roxbury Community College

Roxbury Community College is an urban school currently with minimal recycling activity. There is only one public container available for paper recycling. RCC has no residential facilities. The primary focus for an improved recycling program, therefore, is upon the administration, faculty and classroom buildings. However, both school staff and their waste management and recycling vendor agree that more recycling can and should take place with minimal burden placed on existing staff and budget.

Summary of Key Recommendations

1. Amend current solid waste and recycling contract to provide reports of material quantities managed and allow an "on-call" collection approach or an "on-demand" reduction of scheduled collections when recycling warrants the change.
2. Add two 6-cu. Yd. top-opening containers to collect mixed paper. Mixed paper includes all colors and stocks of uncontaminated paper and paperboard, and includes corrugated cardboard (OCC)).
3. Reduce collections by vendor at all paper containers to twice a month
4. Reduce collections at 10-cu. Yd. waste container from 156 to 133 x/year, due to increased paper diversion.

Summary of Predicted Program Benefits

1. Recycling percentage increases 50% from 20% to 30% of all material managed.
2. One year savings of about $2,500 overall.

3. Average cost per ton for managing all materials is reduced from about $74 to about $66.

Solid Waste Management Practices:

Waste Management and Recycling Vendor:

Jet-A-Way
Contact: 617-541-1000, fax: 617-541-4015

Contract Start date 07/01/2002
Contract End date 06/30/2003

Equipment, Collection Schedule and Contract costs:

1) One 10 cu. Yd., top opening, container at the Academic Bldg; three 6 cu yd., top-opening containers: one at the Student Center, one at 989 Commonwealth Ave and one at the Reggie Lewis Athletic Center. Each of these is currently collected three times each week, plus twelve additional hauls each year.

   10 cu. Yd containers: $935/month; $11,220/year
   6 cu. Yd containers (3): $630/month; $7,560/year

2) **Bulky waste:** one 30 cu. Yd. container collected eight to ten times per year, on an "on-call" basis.

   Haul estimated from vendor proposal documents at $95/haul
   Disposal is at $99.50/ton

3) **Recycling**: one 6 cu. Yd., top-opening container for mixed paper, including an unknown fraction of old corrugated containers, "OCC"

   Haul estimated from contract rate for same sized container at $16/haul

Recycling Collection:

Mailroom staff segregates OCC and there is one bin in the copy center for paper collection. The maintainers (custodians) are responsible for collecting paper at this location and delivering it to the 6 yd. mixed paper bin at the loading dock behind the Student Center. The OCC from the mailroom is also ultimately deposited into the 6 yd. mixed paper bin at the loading dock by the maintainers and collected by Jet-A-Way as a mixed paper/OCC load. Otherwise, college staff call the Facilities department for a pickup if they are doing a file clean out and are generating large amounts of paper and cardboard. The maintainers' responsibility is to collect recyclables from the copy center, mailroom, and on-call locations. They must also ensure that the loads are contamination

free and remove contamination from the collection bin. RCC had a more extensive recycling program in past, but it was not successful to due very limited staff resources and problems with contamination.

Costs of Solid Waste Collection

With respect to solid waste, RCC disposes about 260 tons. The total cost for solid waste collection and disposal is $23,913, resulting in a per ton cost of about $90.00 for collection and disposal of solid waste, including bulky collections.

Estimates of recycling rates:

Using the annual waste tonnage estimates provided by Jet-a-Way, 84 tons/year, results in estimates that waste containers are about 85% full when collected. The base case also estimates the paper-recycling container to be 75% full when collected. This case shows Roxbury Community College recycling about 64 tons of mixed paper annually, representing a recycling rate of 20%. Based on recent research, paper represents about 31%[1] of the pre-recycling educational institution waste stream. So, based on estimates in the absence of unit-based data, RCC is recycling about two-thirds of the available paper.

Cost of Existing Recycling Program

The total cost for the recycling program is $840, resulting in an average recycling cost of about $13/ton. The $840 is a "worst case" estimate based upon the similar collection of the same sized container by the same vendor in the primary waste management agreement. It is quite possible the price could be more favorable than estimated, given the current vendor's written suggestion, when proposing waste management options to the school, that: "…it is important to stress that Roxbury Community College should be mindful of the Waste Bans set forth by the Department of Environmental Protection (DEP) and should be implementing strong paper and cardboard recycling programs. This point is important, not only because you are a state run facility, but you will also save money on your trash bills by recycling."

Critical Issues to be Addressed:

- Both the contractor and the Facilities staff report that there is a considerable degree of contamination in the existing recycling containers.
- Recycling container access for staff and students is very minimal on campus. Thus maximum diversion of recyclables is not being achieved.

[1] ***Advancing Resource Management at Fitchburg State College*** (Fitchburg, MA), Tellus Institute for Mass. DEP, January 2002; cites: By weight (before recycling), based on waste stream profiling performed by Harvard University in 2000 and supported by California Integrated Waste Management Board Waste Composition study http://www.ciwmb.ca.gov/WasteChar/BizGrpCp.asp - educational institution data.

- Limited staff availability to work on program.
- Commuter campus with no residences. Makes communication challenging.

Contract Evaluation:

CONTRACT TERMS

Contract terms are based upon lump sum monthly rates for scheduled service for four waste containers and one recycling container. There are also twice annual collection periods for bulky waste. The container is collected four to five times per year. The school's current waste management vendor, Jet-A-Way has recommended that more OCC/paper should be recycled for environmental and financial reasons, as well as compliance with State mandates. The proposed increase in paper recycling, represented in the hypothetical case attached, bear out this recommendation.

GENERAL SUGGESTION FOR CONTRACT IMPROVEMENT

While the estimated generation, disposal and cost of management per estimated ton numbers are nominal at RCC, lump sum pricing with no firm weight records for any materials is a weak point. Whatever the program diverts today, there should continue to be an interest in finding improvements. Having unit prices for disposal and container services, as well as accurate quantity/weight records for material flow, are an important tool in accomplishing the goal of an improved recycling program. In particular, it would be highly desirable to have a unit price/ton for disposal or other management for all materials managed, as well as accurate reports of actual weight of material accepted at a disposal facility.

SUGGESTION FOR CONTRACT IMPROVEMENT

It is important to institute unit measurement and some review of unused container capacity collected on a schedule, to determine if "on-call" collection will result in a cost savings for the college.

The first step necessary for RCC to improve their existing program is establishing waste management and recycling services agreements that offer both unit based pricing and clear reporting of material generation and management data. In addition, an on-call collection basis, rather than scheduled, may allow some reduction in collections necessary or the use of smaller containers. This should result in a reduction in fees.

EXISTING MECHANISMS THAT ALLOW FOR RECOMMENDED CHANGES

There are 35 solid waste services vendors, qualified as contractors under Mass OSD's statewide contract (ST1J391) for waste removal and recycling services that explicitly make it possible to switch to "on-call" services. Contract ST1J391 requirement #11 requires that: *All contractors must agree to* ***reduce collection*** *frequency at department facilities at any time during the agreement period should a facility request such a reduction as a result of greater recycling and/or waste prevention activities. Such reductions in collections should result in associated reductions in price.* It is possible that an on-call collection system would be more cost-effective.

DETAILED SUGGESTION

Even if a lump sum fee arrangement should continue, if the school receives accurate reports on quantities managed, a reasonable calculation of per ton costs can be established and tracked through potential future changes. Once again, OSD's contract, ST1J391 would provide a solution. Requirement #10 requires that: *Contractors must submit* ***semi-annual statewide reports*** *to the PMT and must submit individual facility reports upon request which details the quantity of materials disposed of and/or recycled during the previous 6 months*. Since the contracts language does not specify that "weight" be provided, volumes may be the only measure of quantity available. However, if the "on-call" collection approach were adopted and containers were a known percentage full when hauled, reasonable weight estimates can be made from industry volume to weight conversions. If weight slips could actually be negotiated with the vendor, that would be the ideal circumstance. RCC could ask its current vendor if it would be willing to meet the same contract requirements as vendors on the statewide contract.

Recommendations to upgrade current recycling:

Waste Management:

1. Amend agreements to provide accurate reporting of material amounts managed, in addition to unit prices for container services. This will allow a more accurate tracking of materials managed and the unit price per ton for each material managed.
2. Carefully review how full all solid waste and recycling containers are before collected to see if a reduced schedule and/or an "on-call" collection approach can be adopted to result in a cost savings for RCC. Those savings could be utilized to expand the recycling program.
3. If additional recycling occurs as a result of recommendations below, it is expected that a reduction in collections of 10-cu. yd. solid waste container from 156 to 133 x/year would be warranted to offset tons recycled and not disposed.

Recycling:

1. Add two 6-cu. Yd. open top containers for mixed paper and reduce collection schedule for all three, paper containers to twice a month from once a month.
2. Increase OCC and mixed paper diversion by providing paper collection bins scaled to desk side use in all administrative areas and in other locales of high diversion (near printers, copiers, clusters of offices).
3. To minimize the burden on the custodial staff, place 65 gal wheeled toters for mixed paper in common areas (being aware of not impacting egress routes) that staff and students must deposit their deskside container contents into. The custodial staff then would wheel these toters down to the loading dock and empty them into the recycling dumpster. This will alleviate the need for the maintainers to service each deskside container. While this method may diminish participation somewhat, it will allow an expanded recycling program with restricted staff resources. Additionally, these toters should not be placed in out of the way areas, where they would be likely to gather more contamination. It is not recommended, for instance, that recycling containers be placed in classrooms where many schools report having significant contamination problems, but rather in faculty, administrative areas, copy locations, and libraries.
4. Contamination can be minimized by highly visible and easy to understand signage (stickers on containers indicating what materials may be included, posters describing the recycling program, etc.) Examples of effective signage materials can be found at: http://www.resourceventure.org/edu_body.htm#resources. Signage must be placed on each recycling bin and someone must monitor to ensure that it remains there. Ensure that there is a trash container within close proximity of each recycling bin to minimize contamination.
5. A site visit for the facilities staff and other administrative staff to another similar school (urban, public school, potentially Bunker Hill Community College) with a vibrant recycling program is highly recommended. This will give the staff who may feel overwhelmed with the idea of making changes to their program real encouragement that recycling can succeed in the face of apparent obstacles (financial and staff resources, space).
6. Develop a recognition campaign for staff and students involved in the program management.
7. Designate one work study student to monitor recycling program- ensure signage stays intact and in place, remove contamination, conduct email and other motivational campaigns for student and staff, monitor container placement to ensure in areas of highest usage, etc.
8. Provide maintenance staff "piggy-back" OCC and mixed collection bins to take from office to office when collecting MSW.
9. Recommendations need to place minimal burden on custodial staff. While RCC does have a limited maintenance staff, it is believed that having a work-study student to assist with the program will help the program run more smoothly and easily for the staff. Additionally, if cost cutting measures related to contracts are

undertaken, the school may want to consider utilizing the additional funds to support extra hours for existing staff who service the recycling program.

Spreadsheet Tracking Model

The consultants have developed spreadsheet tracking models to assist the school's planning staff in attaining the optimal cost scenario for their existing or planned recycling and solid waste management programs. This tool should prove enormously helpful in assisting schools to make the necessary adjustments in targeted materials, containers, vendors, etc., to achieve the highest possible diversion at the lowest possible cost.

The models works as follows:

The tracking model is an Excel workbook, consisting of two primary worksheets, followed by a series of additional worksheets that could be employed to address additional expense or revenue items like amortizing purchased equipment or generating an equipment replacement fund. Any additional expense or revenue issues could be added to this model in the future as required.

The first worksheet includes basic data about the existing program and circumstances, such as the rate of inflation, the densities of different materials and the current revenue per ton for recyclable materials. These assumptions can be changed, if necessary, due to changing circumstances over time. In addition, on the first worksheet, there is an extensive input matrix, with each data input item highlighted in yellow.

This matrix provides spaces to profile current or future container and collection schedules for waste and for recyclables. For each container type, there are input spaces for: # of containers, the size, collection schedule and known fees for collection, container leases or disposal, percent full when collected.

For the first year, we have attempted to capture, as accurately as the available data allows, what the current circumstances are for all containers for all materials. This column represents the "base case." The power of the model lies in its capacity to allow "what-if" estimates for future years, by varying any of the input variables highlighted in yellow.

Using the data and assumptions described above, the first worksheet calculates the following:

Total waste collection cost
Total waste disposal cost
Total tons of waste disposed
Total recycling cost

Tons of mixed paper recycled
Tons of OCC recycled
Tons of commingled containers recycled
Total waste and recyclable material generation in tons
Recycling percentage
Annual mixed paper revenue
Annual OCC revenue
Annual commingled revenue

The second worksheet of the model is a Budget Summary pro-forma, which takes data from the assumptions and data sheet and breaks out the financial implications of the base case, as well as any what-if scenarios. In addition to restating the total expenses for waste collection and disposal as well as recycling programs, this worksheet breaks out the cost/ton to manage waste, cost/ton to manage recyclable materials and combined cost/ton for all materials. If revenues are relevant, the revenue stream is also captured. Finally, the annual total for all waste and recycling activities is calculated, as is a three-year total.

Therefore, as container sizes, collection schedules or fees are changed, the impact on total recycling percentage, cost, cost/ton for waste and recyclables management can be easily seen. This allows the opportunity to establish hypothetical cases and compare the costs and volumes managed to the current base case. As years pass, the model continues to sharpen each current case, while providing more accurate predictions for possible future cases. When each year has passed, comparing actual results to what had been predicted a year or more earlier allows one to easily assess the degree to which performance expectations have been met or where changes may still be needed. In any event, each campus will have a clear and accurate picture of volumes of materials being diverted and disposed, as well as all costs related to those activities.

Environmental and Cost Benefits of Implementing Recommendations:

1. Increased OCC and mixed paper diversion is likely to reduce the MSW heading to the landfill or incinerator. This has both a financial and environmental benefit in resource savings (trees, energy, water).
2. There is a savings in landfill capacity, which is at a real premium especially here in Massachusetts. Much MSW is shipped out of state, which has a huge cost both financially and environmentally. By diverting material from the incinerator, results in a net reduction in potentially harmful air emissions
3. The proposed changes result in an estimated increase in recycling rate of 50%, rising from 20% to 30% of all material managed.
4. The proposed changes result in an estimated decrease in disposal of over 25 tons, from 258 to 225 tons.

5. The proposed changes result in an estimated net savings of about $2,500, after the cost of additional collections and containers covered by the estimated savings in disposal.
6. Base Case - Data interpretation: (***Please refer to Attachment A – Worksheets One & Two***). The current situation or "base case" is reflected in the first column, throughout the model. This column includes all actual annual data available. The total cost of all material management is estimated as $23,913, found on the second worksheet at the bottom of the budget pro-forma. Also found on this worksheet, are the following average "base case" costs: $89.27/ton of MSW managed; $13.05/ton of recyclable materials managed; and $74.08/ton for all materials managed.
7. Year One of proposed changes - Data interpretation: (***Please refer to Attachment A – Worksheets One & Two***). The first year of proposed changes is reflected in the second column, throughout the model. This column includes the addition of two 6 cu. Yd paper collection containers, while reducing collection of the three paper containers from once a week to once every other week. Disposal collections at the 10 cu. Yd containers are estimated as being reduced from 156 to 133 to compensate for the estimated increase in diversion and decrease in disposal. The total cost of all material management is estimated as $21,424, a reduction from the base case of $2,489. Also found on this worksheet, are the following average "Year one" costs: $89.42/ton of MSW managed; $13.05/ton of recyclable materials managed; and $66.53/ton for all materials managed.

Conclusions:

- Largest immediate benefit would derive from an improved MSW management contract and disposal oversight, which may be achieved by requesting the favorable terms of the Mass OSD statewide waste management contract (ST1J391) from their current vendor.
- In the current contract environment, the financial incentive is clear to divert more paper and reduce fees devoted to waste collection and disposal.
- There would be a need for outreach and adjustments to in-building collection activities to support paper diversion success.
- Savings in waste collection and disposal can offset some of the additional costs of additional paper collection.
- An on-call collection system, hauling only very full containers, may add additional savings that might be used to offset additional incremental expense of paper collection infrastructure.